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COOPERATIVE SNOW SURVEYS AND WATER SUPPLY FORECASTS

for

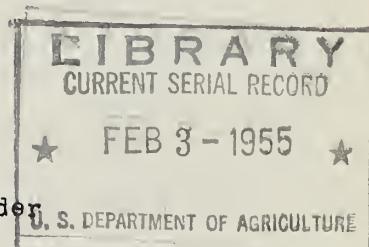
A R I Z O N A

(Salt, Verde, Gila
and
part of Lower Colorado River Basin)

Issued

January 15, 1955

Report Prepared
By
W. E. Anderson, Snow Survey Leader



Salt River Valley Water Users' Association
and
Soil Conservation Service
Main Post Office Bldg.
Phoenix, Arizona

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~~W. W. Pickrell~~
President
Salt River Valley Water Users' Assn.

the first time, and the author has been unable to find any reference to it in the literature. It is described here, and its properties are discussed.

The method consists of a series of steps:

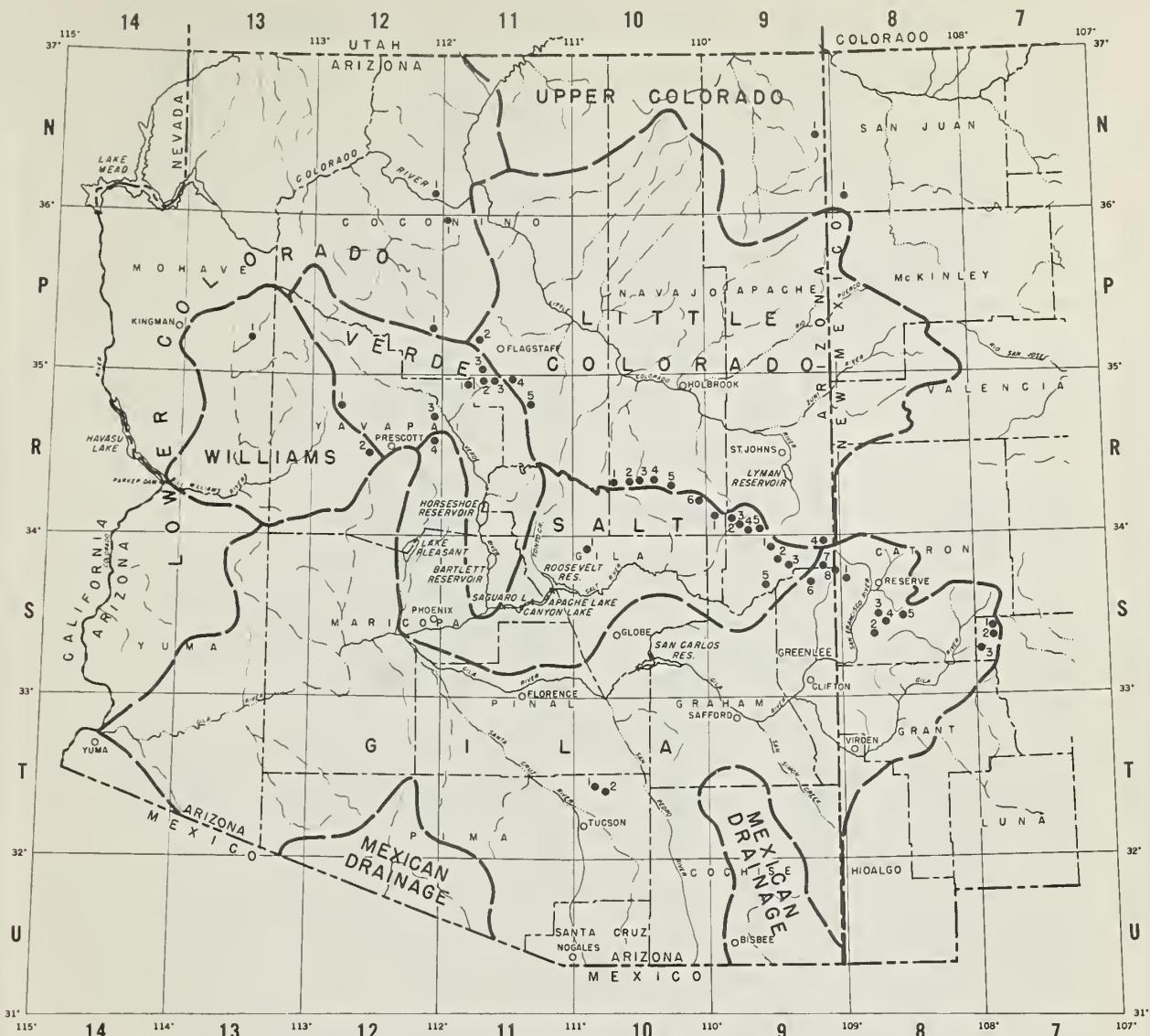
1. A sample of the material to be analyzed is taken and placed in a small container.
2. A small amount of a reagent is added to the sample.
3. The mixture is heated to a temperature of approximately 100°C.
4. The mixture is cooled to room temperature.
5. The resulting product is collected and washed with a solvent.
6. The product is dried and weighed.

The yield of the product is approximately 50%.

The properties of the product are as follows:

- 1. It is a white, crystalline solid.
- 2. It has a melting point of approximately 150°C.
- 3. It is soluble in organic solvents such as benzene, chloroform, and acetone.
- 4. It is insoluble in water.
- 5. It is stable at room temperature for several months.

The author believes that this method can be used to analyze a wide variety of materials, and that it may be particularly useful for the analysis of organic compounds.

LEGEND

- ORAINAGE BASIN BOUNDARY
- 13 ● SNOW COURSE

ARIZONA COOPERATIVE SNOW SURVEYS

SNOW COURSES AND DRAINAGE BASINS
JANUARY 1955

0 40 80 120 160 200
SCALE IN MILES

INDEX TO SNOW COURSES

NUMBER	NAME	SEC	TWP	RGE**	ELEVATION	RIVER BASIN
11-P-3	Antelope Park	29	19N	8E	7300	Verde # Discontinued
9-S-1	Baldy	28	7N	27E	9000	Salt-Little Colorado
10-T-1	Bear Wallow	6	12S	16E	8100	Gila
9-S-6	Beaver Head	13	4N	30E	8000	Salt-Frisco
9-S-3	Big Lake Knoll	2	5N	28E	8800	Salt-Frisco-Little Colorado .. Discontinued
7-S-3	Black Canyon	8	13S	11W***	6790	Gila
12-N-1	Bright Angel	34	33N	3E	8400	Lower Colorado
12-R-1	Camp Wood	3	16N	6W	5700	Williams-Verde
10-R-3	Canyon Creek (s)	18	11N	15E	7500	Salt
11-R-2	Casner Park (s)	19	18N	8E	6950	Verde
12-P-1	Chalender (s)	27	22N	3E	7100	Verde
8-S-3	Corner Mountain	7	10S	17W***	8850	Gila-Frisco
9-S-7	Coronado Trail	26	5N	30E	8000	Salt-Frisco
10-R-2	Elk	31	11N	14E	7600	Salt-Little Colorado Discontinued
10-R-6	Forest Dale (s)	2	9N	21E	6000	Salt-Little Colorado
12-R-4	Gaddes Canyon	11	15N	2E	7600	Verde #
10-R-5	Gentry	36	11N	15E	7600	Salt-Little Colorado
11-P-2	Fort Valley	22	22N	6E	7350	Verde #
9-R-5	Ft. Apache	18	7N	27E	9160	Salt-Little Colorado
8-S-1	Frisco Divide	31	6S	20W***	8000	Frisco-Gila
11-P-1	Grand Canyon	21	30N	4E	7500	Lower Colorado
11-R-5	Happy Jack	30	17N	9E	7630	Verde
10-R-4	Heber	28	11N	15E	7600	Salt-Little Colorado
7-S-2	Inman	6	11S	10W***	7800	Gila
12-R-2	Iron Springs	22	14N	3W	6200	Williams-Verde
9-S-2	Maverick Fork (s)	13	6N	27E	9050	Salt-Little Colorado
9-R-4	McKay Peak	13	7N	24E	8250	Salt Not read
9-R-2	McNary (s)	14	8N	23E	7200	Salt-Little Colorado
9-R-1	Milk Ranch	28	8N	23E	7000	Salt
12-R-3	Mingus Mountain	3	15N	2E	7100	Verde #
8-S-2	Mogollon	2	11S	19W***	7000	Frisco-Gila
11-R-4	Mormon Lake	13	18N	8E	7350	Verde #
11-R-3	Mormon Mountain(s)	14	18N	8E	7500	Verde
11-R-1	Munds Park (s)	7	18N	7E	6500	Verde
8-S-4	N-Bar Lake	16	10S	17W***	8600	Gila
8-S-5	Negrito	6	10S	16W***	8200	Gila
9-S-4	Nutrioso	23	6N	30E	8500	Salt-Frisco-Little Colorado
9-S-5	Pacheta	At town of Maverick, Ariz.			7800	Salt
9-N-1	Roof Butte	15	8N	6W****	8500	Little Colorado # Not read
10-T-2	Rose Canyon	15	12S	16E	7300	Gila
9-S-8	State Line	6	6S	21W***	8000	Gila-Frisco
7-S-1	Taylor Creek	20	10S	10W***	7850	Gila
9-R-3	Trout Creek	5	7N	24E	6400	Salt Not read
8-N-1	Washington Pass	Lat. 36°05'N. Long. 108°50'W. §			8600	Little Colorado # Not read
13-P-1	Willow Ranch	16	21N	11W	5000	Williams
10-R-1	Woods Canyon	15	11N	13E	7640	Salt-Little Colorado Discontinued
10-S-1	Workman Creek	33	6N	14E	6900	Salt

* Number indicates location of course within coordinate rectangle, thus 9-N-1 is Course #1 in coordinate rectangle 9-N.

** All in Gila and Salt River Base and Meridian except where otherwise indicated.

*** New Mexico Principal Meridian.

**** Navajo Base.

On adjacent drainage.

(s) Soil Moisture Station installed on or in vicinity of course.

§ Unsurveyed.

* * * * *

* Present snow cover and soil moisture conditions
* indicate a runoff potential much below average
* on all watersheds. This is early in the season
* and there is ample time for conditions to change,
* but sustained above-normal precipitation and
* favorable conditions will be necessary before
* water supply prospects can be substantially im-
proved.

* * * * *

GENERAL

Deficient fall precipitation and extremely dry soils gave a January 1st indication of possible runoff ranging between 35 percent of average for the Tonto and Frisco to 70 percent of average for the Verde, with the Gila at 45 percent and the Salt at 50 percent.

These conditions are somewhat improved as a result of the heavy precipitation in the first half of January. However, there still exists an average deficiency in excess of 3-3/4 inches of precipitation over most of the drainage areas. Measurements of soil moisture show that the soil is extremely dry, approaching the condition that existed at this time last year. The soil will require greater amounts of moisture than now exist in the snow pack merely to achieve saturation, before runoff can occur.

Little or no fall rain occurred in the mountain areas subsequent to October 1st. The precipitation in the antecedent period was among the lowest on record, and is reflected in stream flows that have been at extremely low stages. Late fall flows on the Salt River, for instance, were among the lowest on record, as a result of the exceptionally dry conditions on the watersheds.

Continued above-normal precipitation will have to prevail along with conditions favorable for the accumulation of the snow pack and subsequent runoff, if average or greater runoff is to be obtained.

Snow-cat trouble prevented measurements on the higher mountain areas on this date.

The first seasonal water supply forecast this year will be included in the February 1st bulletin and based on conditions as of that date.

SNOW COVER AND WATERSHED CONDITIONS

Snow on all watersheds is generally dry and powdery. Some blowing and drifting has occurred but this is not a widespread condition. Water contents are generally below average and far less than the present deficiency in soil moisture.

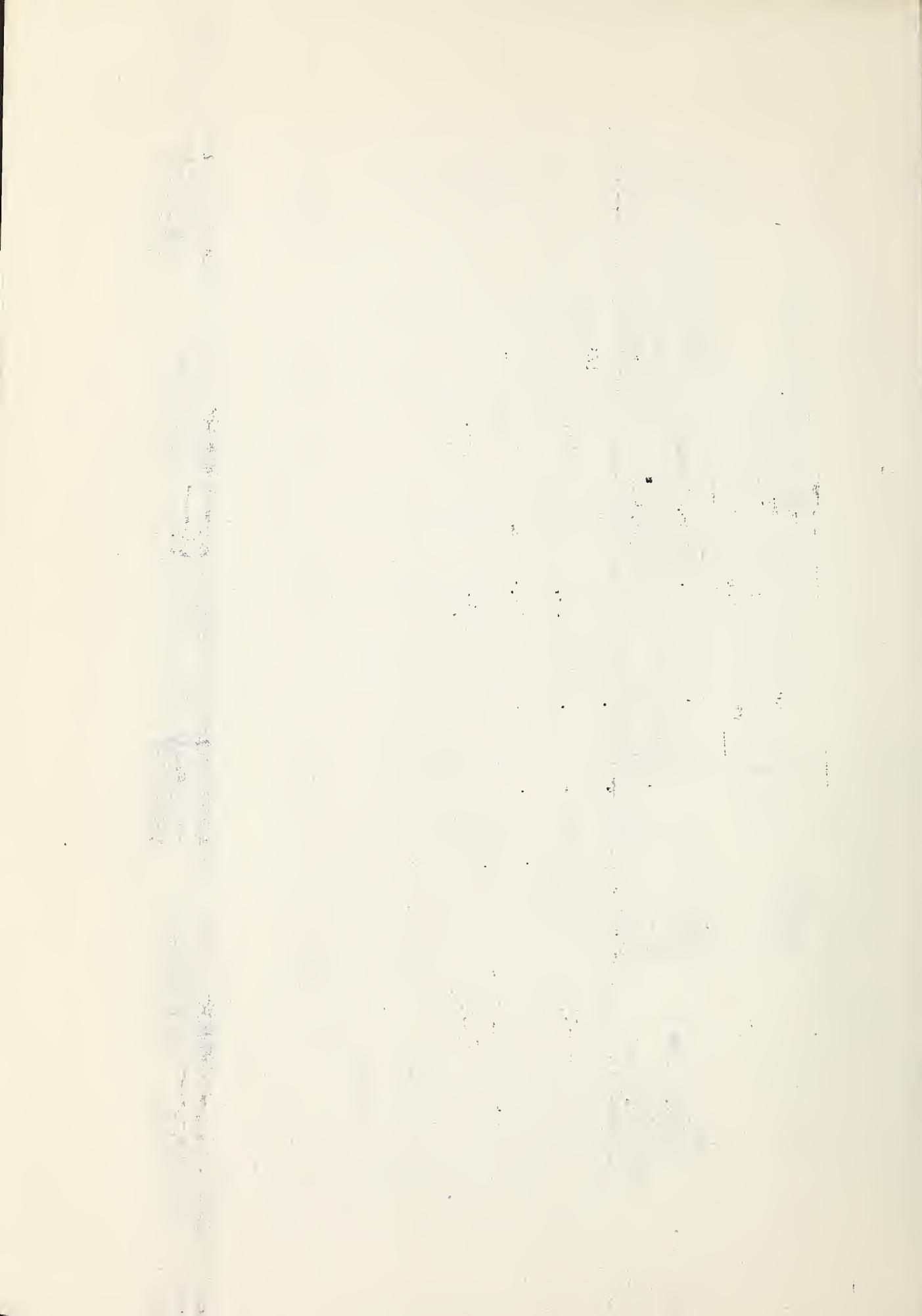
Snow cover and soil moisture conditions at this time are somewhat better than at the corresponding time last year, but of all recent years most closely resemble conditions in 1953, a year which did not produce satisfactory runoff quantities.

Snow and rain up until January 15th were heaviest on the Salt-Verde drainages. The upper Frisco and Blue received substantial amounts as reflected in the snow courses at Beaver Head, State Line, and Frisco Divide. East of these, however, the total amount decreased rapidly with no snow on the ground on the courses on the east side of the Gila River basin proper.

There was a total of approximately 2 inches of moisture fell in this area, however, all of which has gone into the ground and will help to satisfy the soil moisture requirements and reduce the depletion of later snow accumulations. Over-all prospects on the Gila basin are below average at this time, though here again the season is quite early and additional snow pack quite commonly occurs later in the season.

SUMMARY OF JANUARY 15, 1955 SNOW SURVEYS AND COMPARISON OF DATA
WITH THAT OF PREVIOUS YEARS BY WATERSHEDS

WATERSHEDS	No. of Courses in 1955			Snow Depth in inches			Snow Water Content in inches			Snow Density in 1955			1955 Water Content in percent of Average		
	Average	1955	1954	1955	1954	1953	Average	Percent	1954	1955	Percent	1954	1955	Average	
Gila River	9	10	1.7	0.5	1.2	1.4	15.7	340	121						
Salt River	8	13	2.1	1.2	3.6	2.3	16.7	175	91						
Verde River	5	13	2.9	0.6	1.6	2.1	22.3	483	138						
Williams River	3	10	3.0	1.0	0.0	1.2	24.3	300	250						
Lower Colorado	4	13	2.4	0.9	3.4	3.6	18.5	267	67						
Little Colorado	5	11	2.0	0.9	1.9	2.1	18.2	222	95						

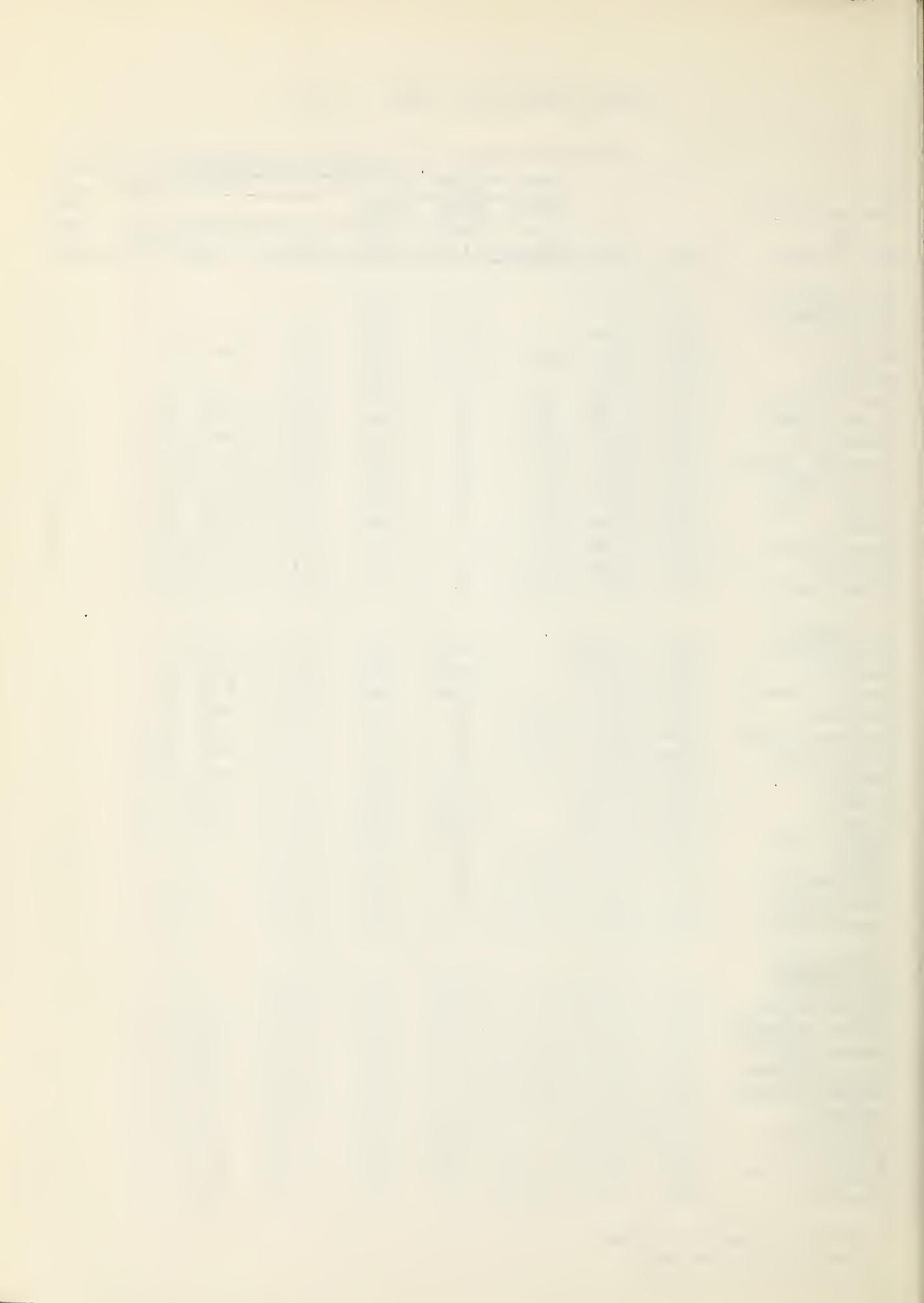


ARIZONA SNOW SURVEY JANUARY 15, 1955

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	Date of Survey	SNOW COVER MEASUREMENTS				Year of Record	
				1955		PAST RECORD			
				Snow Depth (in.)	Water Content (in.)	Water Content (in.)	Water Content (in.) 1954 1953 Average		
<u>GILA RIVER</u>									
Corner Mountain	8-S-3	8,850		N.S.	N.S.	-	-	-	
N-Bar Lake*	8-S-4	8,600		N.S.	N.S.	-	-	-	
Nutrioso	9-S-4	8,500	1/21	17	2.7	0.8	0.8	1.8	
Negrito*	8-S-5	8,200		N.S.	N.S.	-	-	-	
Bear Wallow*	10-T-1	8,100	1/15	15	3.9	1.5	3.9	2.5	
Frisco Divide	8-S-1	8,000	1/21	18	3.1	0.2	2.0	1.6	
State Line	9-S-8	8,000	1/21	21	3.5	0.0	2.2	2.0	
Coronado Trail	9-S-7	8,000	1/21	16	3.0	0.6	2.5	2.6	
Beaver Head	9-S-6	8,000	1/21	18	1.8	1.1	3.7	2.5	
Taylor Creek	7-S-1	7,850	1/15	0	0.0	0.0	0.0	0.6	
Inman	7-S-2	7,800	1/15	0	0.0	T	0.0	0.5	
Rose Canyon*	10-T-2	7,300	1/15	10	2.1	1.2	0.0	0.7	
Mogollon	8-S-2	7,000	1/15	2	1.0	1.6	0.0	0.8	
Black Canyon	7-S-3	6,790	1/15	0	0.0	0.0	0.0	2	
<u>SALT RIVER</u>									
Ft. Apache**	9-R-5	9,160		N.S.	N.S.	4.2	3.6	4.3	
Baldy**	9-S-1	9,125		N.S.	N.S.	3.9	3.9	4.3	
Maverick Fork	9-S-2	9,020		N.S.	N.S.	2.8	4.5	5.0	
Nutrioso	9-S-4	8,500	1/21	17	2.7	0.8	0.8	1.8	
Coronado Trail	9-S-7	8,000	1/21	16	3.0	0.6	2.5	2.6	
Beaver Head	9-S-6	8,000	1/21	18	1.8	1.1	3.7	2.5	
Pacheta	9-S-5	7,800	1/15	10	1.7	1.0	4.9	3.5	
Gentry	10-R-5	7,600		N.S.	N.S.	0.2	1.9	1.7	
Heber	10-R-4	7,600		N.S.	N.S.	0.2	2.4	1.6	
Canyon Creek	10-R-3	7,500		N.S.	N.S.	0.2	3.0	1.9	
McNary	9-R-2	7,200	1/14	7	1.1	1.7	-	2.3	
Milk Ranch	9-R-1	7,000	1/14	5	0.9	1.3	-	1.3	
Workman Creek	10-S-1	6,900	1/18	23	4.7	2.0	6.3	3.8	
Forest Dale	10-R-6	6,430	1/14	5	1.0	1.4	-	0.9	
<u>VERDE RIVER</u>									
Happy Jack	11-R-5	7,630		N.S.	N.S.	0.9	-	2.6	
Gaddes Canyon	12-R-4	7,600	1/14	20	3.9	1.2	-	-	
Mormon Mountain	11-R-3	7,500		N.S.	N.S.	0.2	5.0	4.0	
Mormon Lake**	11-P-4	7,250	1/15	15	3.3	T	2.5	3.2	
Fort Valley**	11-P-2	7,350	1/14	12	2.1	0.4	2.4	2.5	
Mingus Mountain	12-R-3	7,100	1/14	13	2.8	0.6	0.0	0.8	
Chalender	12-F-1	7,100	1/14	17	3.7	0.5	3.3	3.0	
Casner Park	11-R-2	6,930		N.S.	N.S.	0.1	3.6	2.9	
Munds Park	11-R-1	6,500		N.S.	N.S.	T	-	1.5	
Iron Springs**	12-P-2	6,200	1/17	16	5.9	0.9	0.0	1.2	
Camp Wood	12-R-1	5,700	1/15	9	2.5	1.2	0.0	1.0	

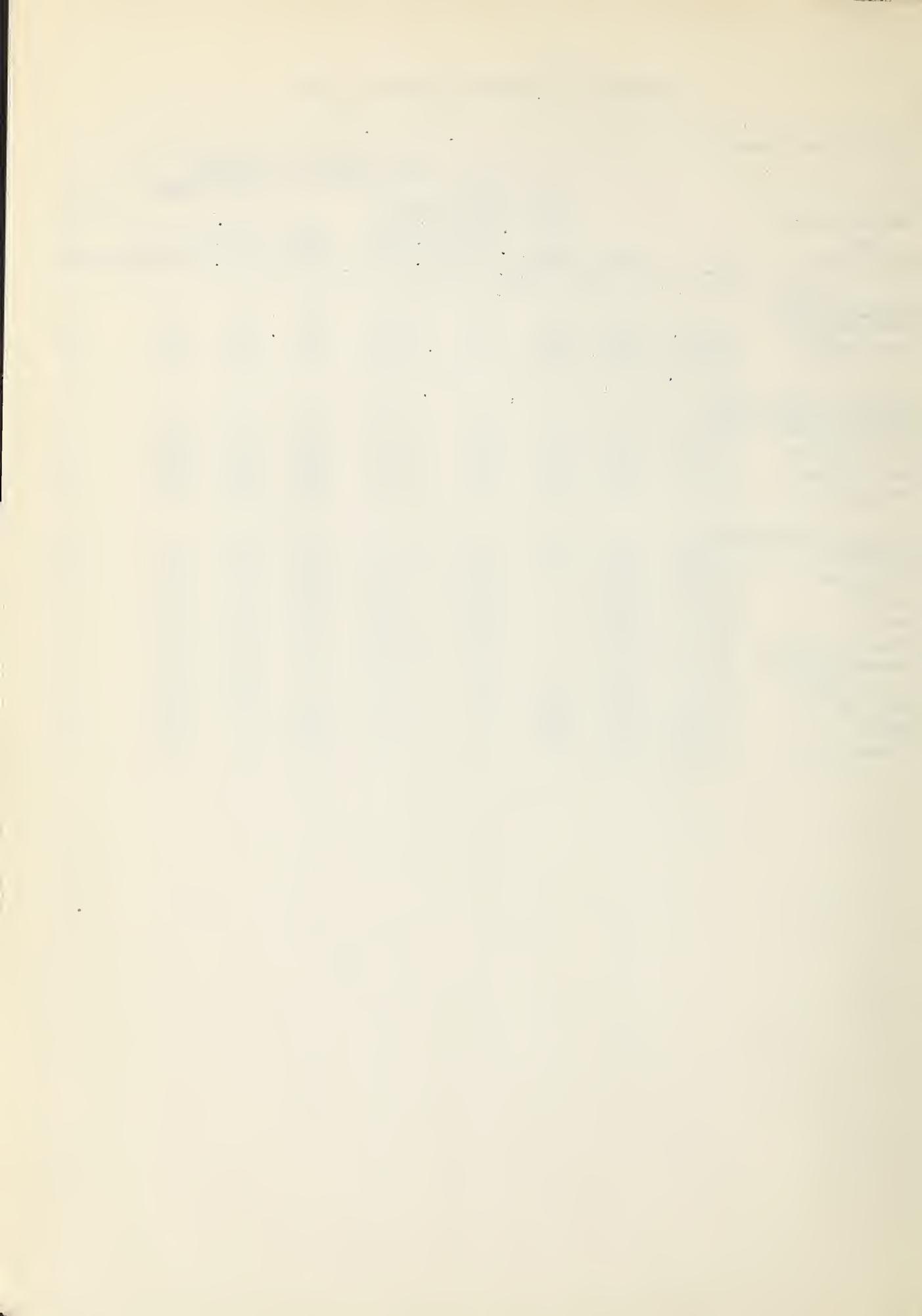
* Not included in averages

** On adjacent drainage



ARIZONA SNOW SURVEY JANUARY 15, 1955

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENTS						Year of Record	
			1955			PAST RECORD				
			Date of Survey	Snow Depth (in.)	Water Content (in.)	Water Content (in.)	1954	1953 Average		
<u>WILLIAMS RIVER</u>										
Iron Springs	12-R-2	6,200	1/17	16	5.9	0.9	0.0	1.2	9	
Camp Wood**	12-R-1	5,700	1/15	9	2.5	1.2	0.0	1.0	9	
Willow Ranch	13-P-1	5,000	1/17	6	0.5	-	0.0	1.5	9	
<u>LOWER COLORADO RIVER</u>										
Bright Angel	12-N-1	8,400	1/20	13	1.8	1.7	6.2	6.6	7	
Grand Canyon	11-P-1	7,500	1/21	10	2.1	0.8	1.5	2.2	7	
Fort Valley	11-P-2	7,350	1/14	12	2.1	0.4	2.4	2.5	8	
Chalender**	12-P-1	7,100	1/14	17	3.7	0.5	3.3	3.0	8	
<u>LITTLE COLORADO RIVER</u>										
Nutrioso	9-S-4	8,500	1/21	17	2.7	0.8	0.8	1.8	15	
Happy Jack	11-R-5	7,630		N.S.	N.S.	0.9	-	2.6	4	
Gentry	10-R-5	7,600		N.S.	N.S.	0.2	1.9	1.7	5	
Heber	10-R-4	7,600		N.S.	N.S.	0.2	2.4	1.6	5	
Canyon Creek	10-R-3	7,500		N.S.	N.S.	0.2	3.0	1.9	5	
Mormon Mountain	11-R-3	7,500		N.S.	N.S.	0.2	5.0	4.0	5	
Mormon Lake	11-R-4	7,350	1/15	15	3.3	T	2.5	3.2	8	
Fort Valley	11-P-2	7,350	1/14	12	2.1	0.4	2.4	2.5	8	
McNary	9-R-2	7,200	1/14	7	1.1	1.7	-	2.3	15	
Forest Dale	10-R-6	6,430	1/14	5	1.0	1.4	-	0.9	15	



STATUS OF RESERVOIR STORAGE JANUARY 15, 1955

BASIN and STREAM	RESERVOIR	USABLE CAPACITY (Thousand Acre Feet)	THOUSAND ACRE FEET IN STORAGE ABOUT JANUARY 15					10-Year Average
			1955	1954	1953	1952	1943-52	
Agua Fria	Lake Pleasant	178	24	32	82	104	13	
Colorado	Lake Havasu	688	610	603	585	597	595	
Colorado	Lake Mohave	1,810	1,721	1,684	1,603	1,581	-	
Colorado	Lake Mead	27,935	12,508	16,741	19,367	17,648	19,570	
Gila	San Carlos	1,200	34	0	4	36	109	
Verde	Bartlett	180	47	31	4	73	24	
Verde	Horseshoe	143	2.2	1	4	54	1*	
Salt	Roosevelt	1,382	570	634	1,019	180	381	
Salt	Apache	245	177	241	238	161	174	
Salt	Canyon	58	18.7	49	57	48	24	
Salt	Saguaro	70	52	14	32	33	16	
Little Colorado	Lyman	28	1.5	-	9	0	7	

* Average for years 1946 through 1952

LIST OF SNOW SURVEYORS

<u>SNOW COURSE</u>	<u>SURVEYOR</u>
Baldy	SCS and SRVWU
Bear Wallow	Wm. Hughes & J.R. Brinkley
Beaver Head	Jess Burke
Black Canyon	Robert M. White
Bright Angel	Valentine & Buss
Camp Wood	Mrs. C. C. Merritt
Canyon Creek	SCS and SRVWU
Casner Park	SCS and SRVWU
Chalender	M. C. Oleson and F. G. Doughert
Corner Mountain	SCS
Coronado Trail	Bill Brainard
Forest Dale	Olson
Frisco Divide	Kenneth Weissenborn
Ft. Apache	SCS and SRVWU
Fort Valley	A. P. Loska
Gaddes Canyon	Richard Enz
Gentry	SCS and SRVWU
Grand Canyon	Dazey and Black
Happy Jack	Emil Ryberg
Heber	SCS and SRVWU
Inman	C. H. McCauley
Iron Springs	Ernest Saxby
Maverick Fork	SCS and SRVWU
Milk Ranch	Olson
Mingus Mountain	Richard Enz
Mogollon	J. R. Wray
Mormon Lake	Robert G. Garey
Mormon Mountain	SCS and SRVWU
Munds Park	SCS and SRVWU
McNary	Olson
N-Bar Lake	SCS
Negrito	SCS
Nutrioso	Bill Brainard
Pacheta	Foch Phillips
Rose Canyon	Wm. Hughes & J.R. Brinkley
State Line	Kenneth Weissenborn
Taylor Creek	F. M. Inman
Willow Ranch	L. W. Miller
Workman Creek	C. L. Moore

The following organizations cooperate in the Arizona snow survey work:

FEDERAL

Department of Agriculture

Forest Service
Apache Forest
Coconino Forest
Coronado Forest
Gila Forest
Kaibab Forest
Prescott Forest
Sitgreaves Forest
Southwestern Forest and Range Experiment Station, Fort Valley, Arizona
Sierra Ancha Forest Experiment Station

Soil Conservation Service

Department of Commerce
Weather Bureau
Arizona Section

Department of Interior

Bureau of Reclamation
Region III

Geological Survey
Arizona District

Bureau of Indian Affairs
Fort Apache Reservation

National Park Service
Grand Canyon National Park

Gila Water Commissioner, Safford, Arizona

IRRIGATION PROJECTS

Salt River Valley Water Users' Association,
Phoenix, Arizona

San Carlos Irrigation and Drainage District,
Coolidge, Arizona

SOUTHWEST LUMBER MILLS, INC., McNary, Arizona

Other organizations and individuals furnish valuable information for the snow survey reports. Their co-operation is gratefully acknowledged.



Federal - State - Private
COOPERATIVE SNOW SURVEYS

Furnishes the basic data
necessary for forecasting
water supply for irrigation,
domestic and municipal water
supply, hydro-electric power
generation, navigation,
mining and industry

"WATER IS THE WEST'S GREATEST RESOURCE"